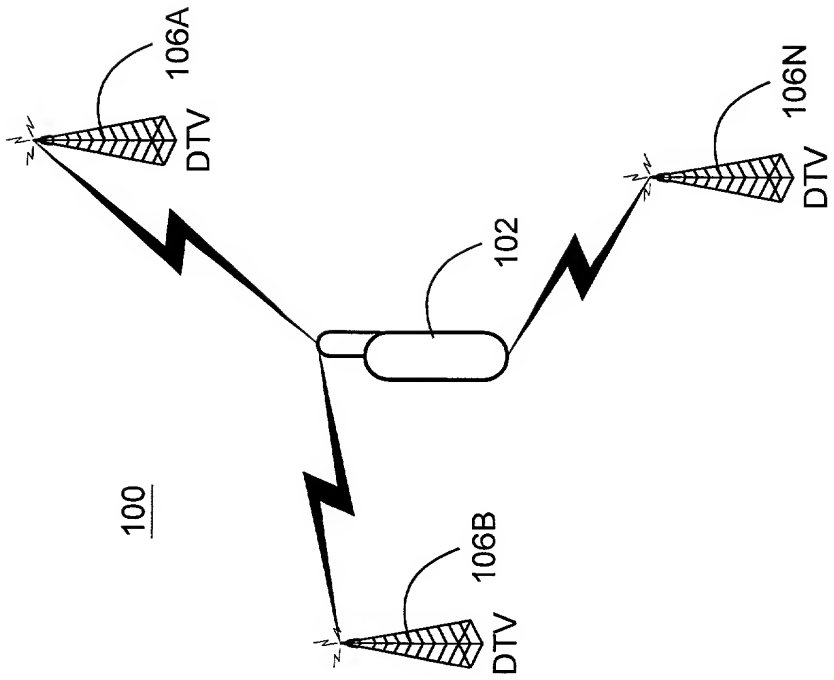

FIG. 1

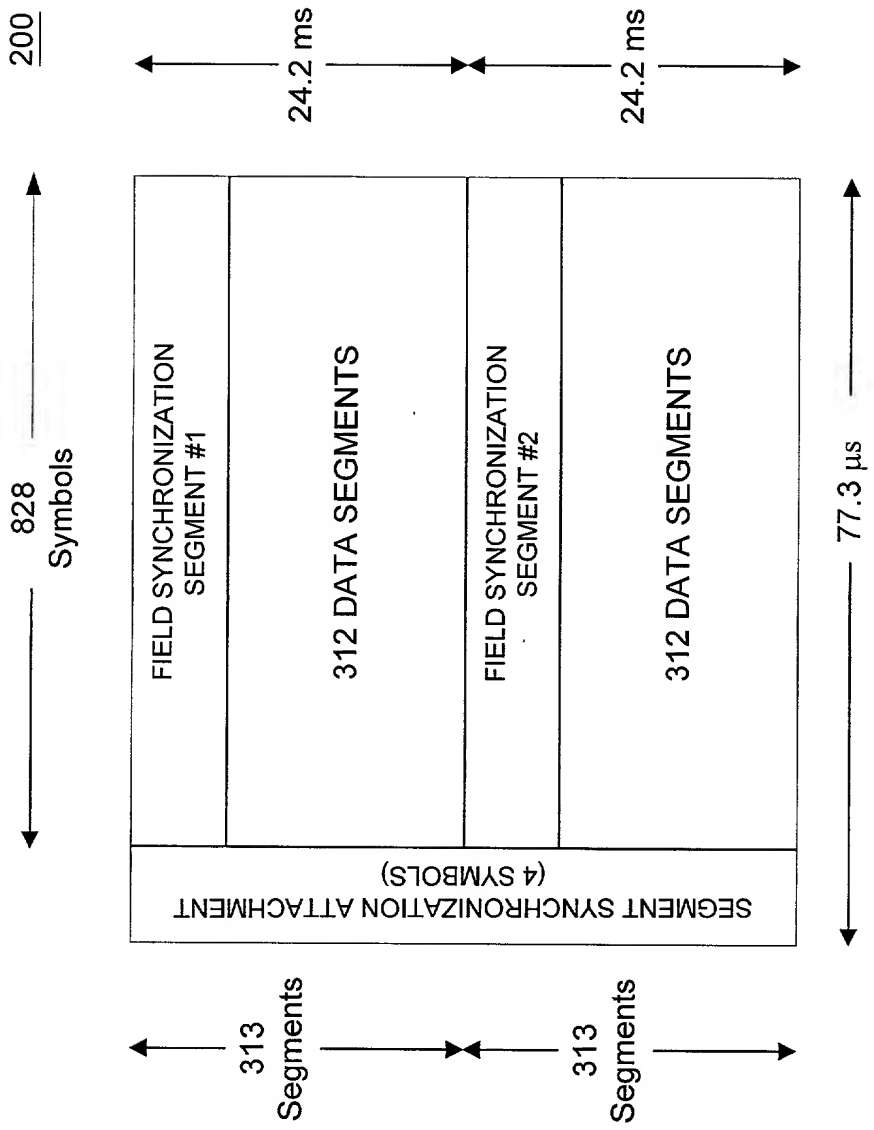
200
24.2 ms
24.2 ms
828
Symbols
FIELD SYNCHRONIZATION SEGMENT #1
312 DATA SEGMENTS
FIELD SYNCHRONIZATION SEGMENT #2
312 DATA SEGMENTS
77.3 μs
SEGMENT SYNCHRONIZATION ATTACHMENT
(4 SYMBOLS)
313
Segments
313
Segments

FIG. 2

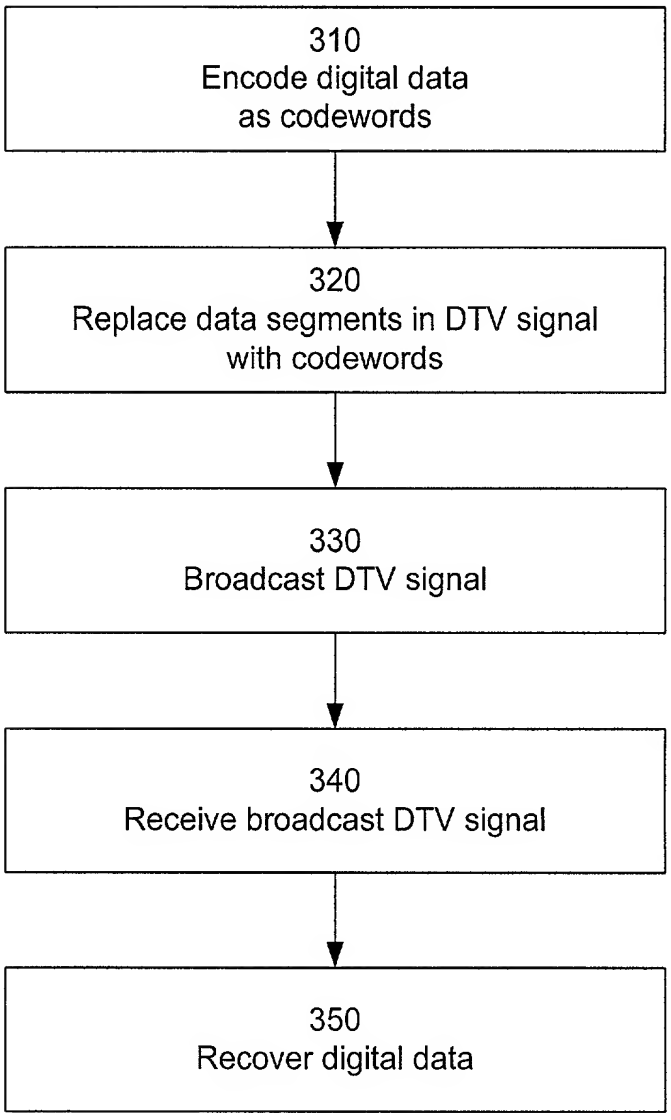
310
Encode digital data as codewords
320
Replace data segments in DTV signal with codewords
330
Broadcast DTV signal
340
Receive broadcast DTV signal
350
Recover digital data

FIG. 3

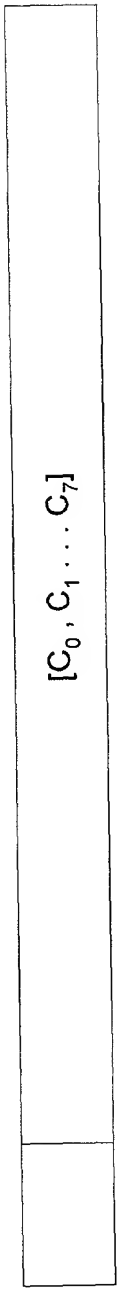

FIG. 4A

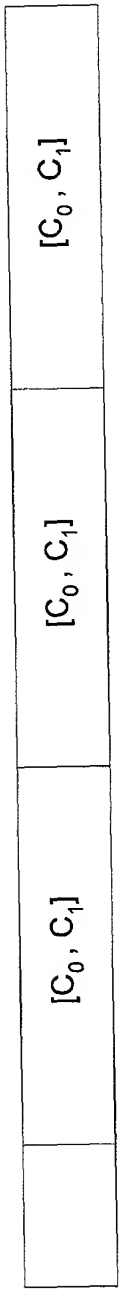

FIG. 4B

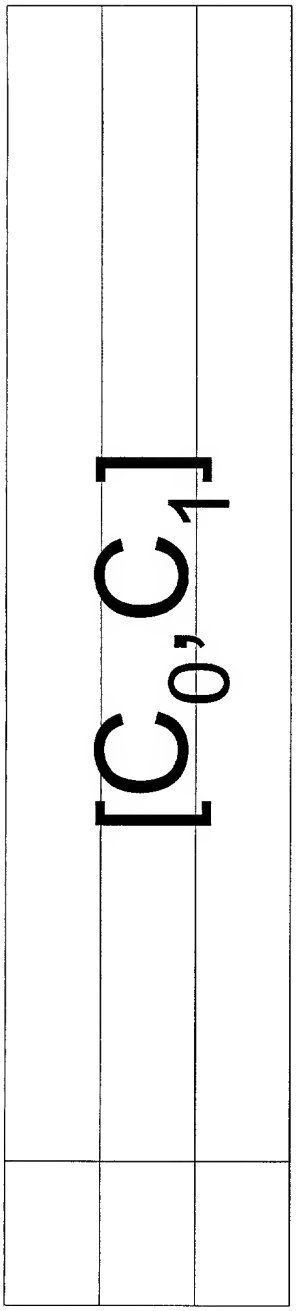
$[C_0, C_1]$

FIG. 4C

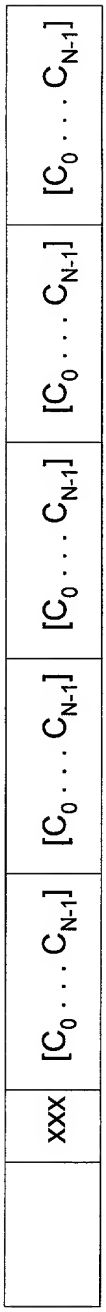
XXX
$[C_0 \ldots C_{N-1}]$
$[C_0 \ldots C_{N-1}]$
$[C_0 \ldots C_{N-1}]$
$[C_0 \ldots C_{N-1}]$
$[C_0 \ldots C_{N-1}]$

FIG. 4D

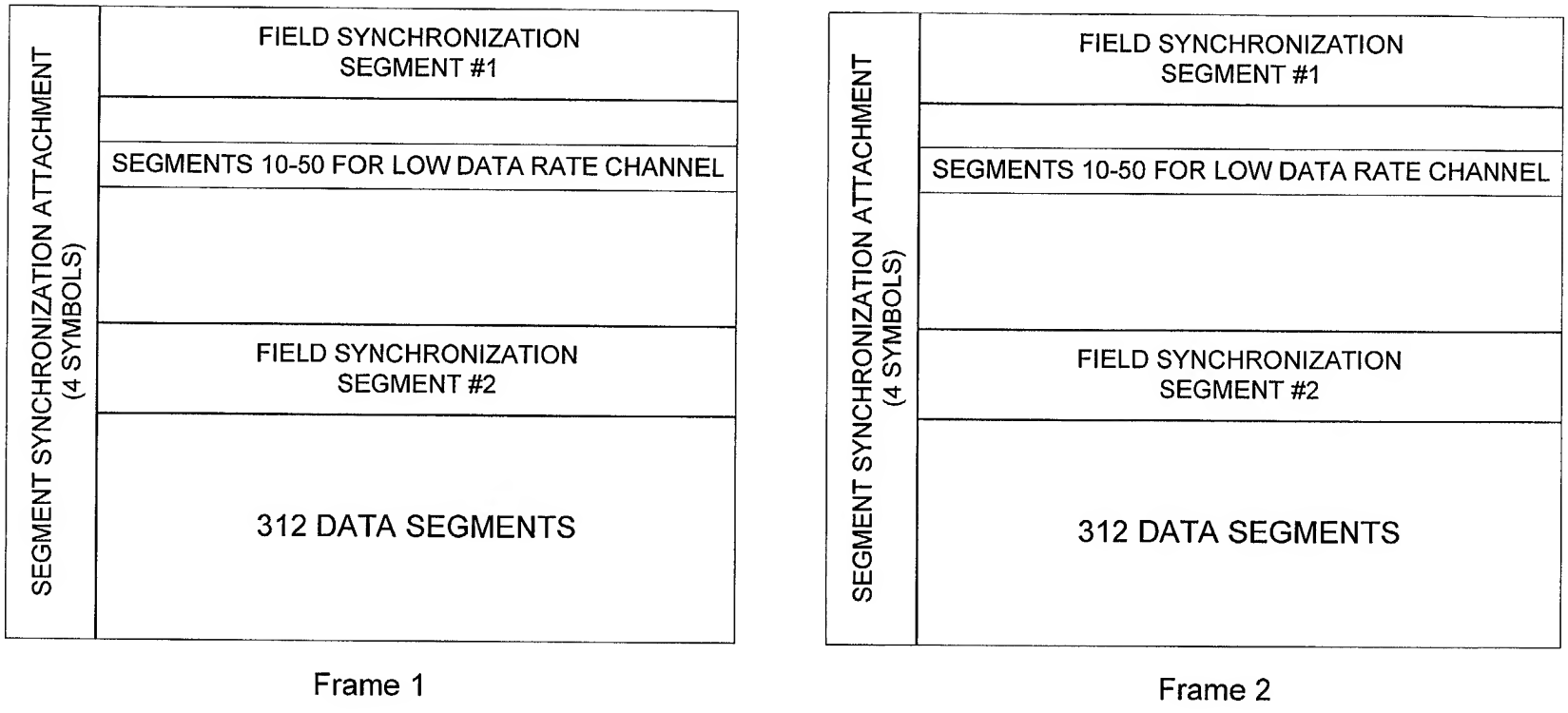
SEGMENT SYNCHRONIZATION ATTACHMENT (4 SYMBOLS)
FIELD SYNCHRONIZATION SEGMENT #1
SEGMENTS 10-50 FOR LOW DATA RATE CHANNEL
FIELD SYNCHRONIZATION SEGMENT #2
312 DATA SEGMENTS
Frame 1
SEGMENT SYNCHRONIZATION ATTACHMENT (4 SYMBOLS)
FIELD SYNCHRONIZATION SEGMENT #1
SEGMENTS 10-50 FOR LOW DATA RATE CHANNEL
FIELD SYNCHRONIZATION SEGMENT #2
312 DATA SEGMENTS
Frame 2

FIG. 5A

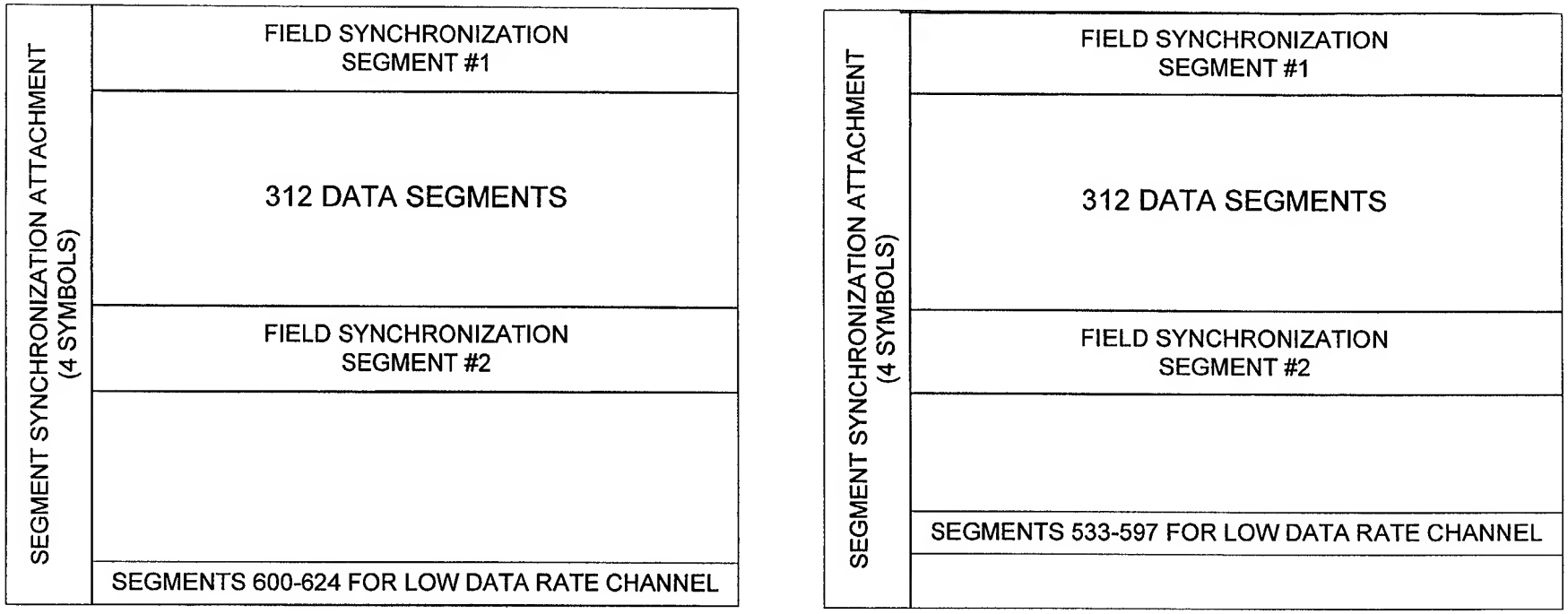
SEGMENT SYNCHRONIZATION ATTACHMENT (4 SYMBOLS)
FIELD SYNCHRONIZATION SEGMENT #1
312 DATA SEGMENTS
FIELD SYNCHRONIZATION SEGMENT #2
SEGMENTS 600-624 FOR LOW DATA RATE CHANNEL
Frame 1
SEGMENT SYNCHRONIZATION ATTACHMENT (4 SYMBOLS)
FIELD SYNCHRONIZATION SEGMENT #1
312 DATA SEGMENTS
FIELD SYNCHRONIZATION SEGMENT #2
SEGMENTS 533-597 FOR LOW DATA RATE CHANNEL
Frame 2

FIG. 5B

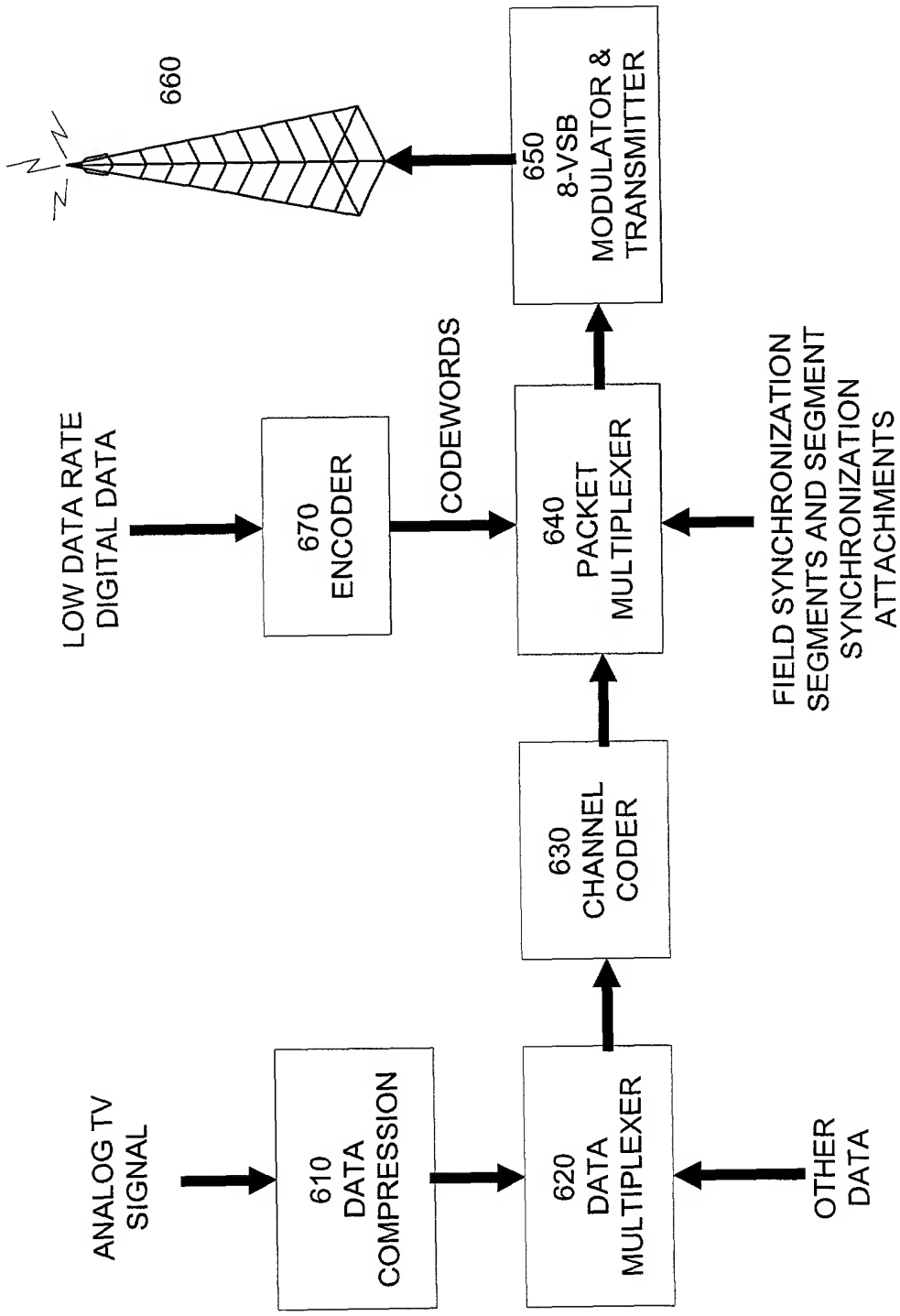
ANALOG TV SIGNAL
610 DATA COMPRESSION
620 DATA MULTIPLEXER
OTHER DATA
630 CHANNEL CODER
640 PACKET MULTIPLEXER
FIELD SYNCHRONIZATION SEGMENTS AND SEGMENT SYNCHRONIZATION ATTACHMENTS
LOW DATA RATE DIGITAL DATA
670 ENCODER
CODEWORDS
650 8-VSB MODULATOR & TRANSMITTER
660

FIG. 6

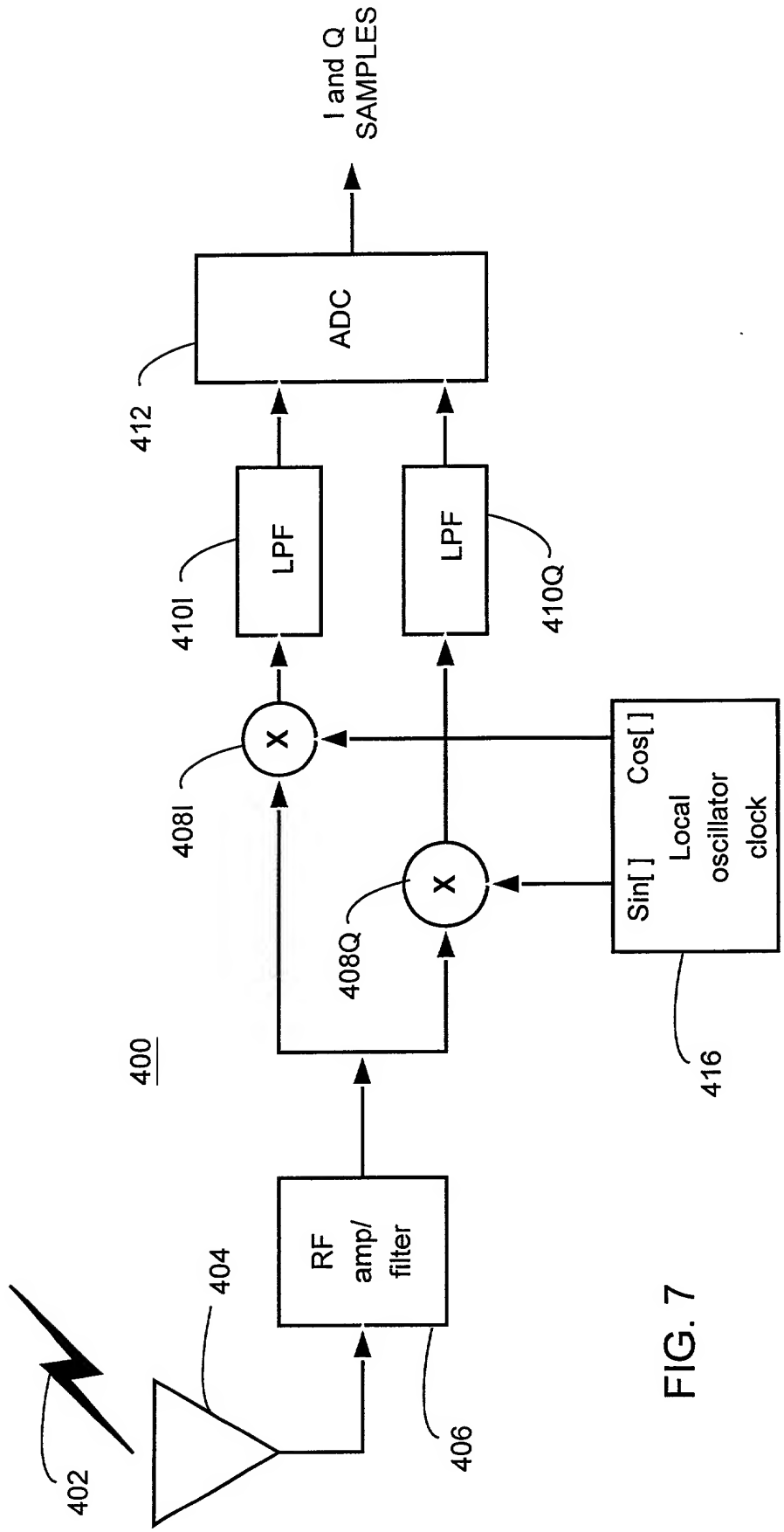
I and Q SAMPLES
ADC
412
LPF
410I
LPF
410Q
X
408I
X
408Q
Cos[ ]
Sin[ ]
Local oscillator clock
416
400
RF amp/ filter
404
406
402

FIG. 7

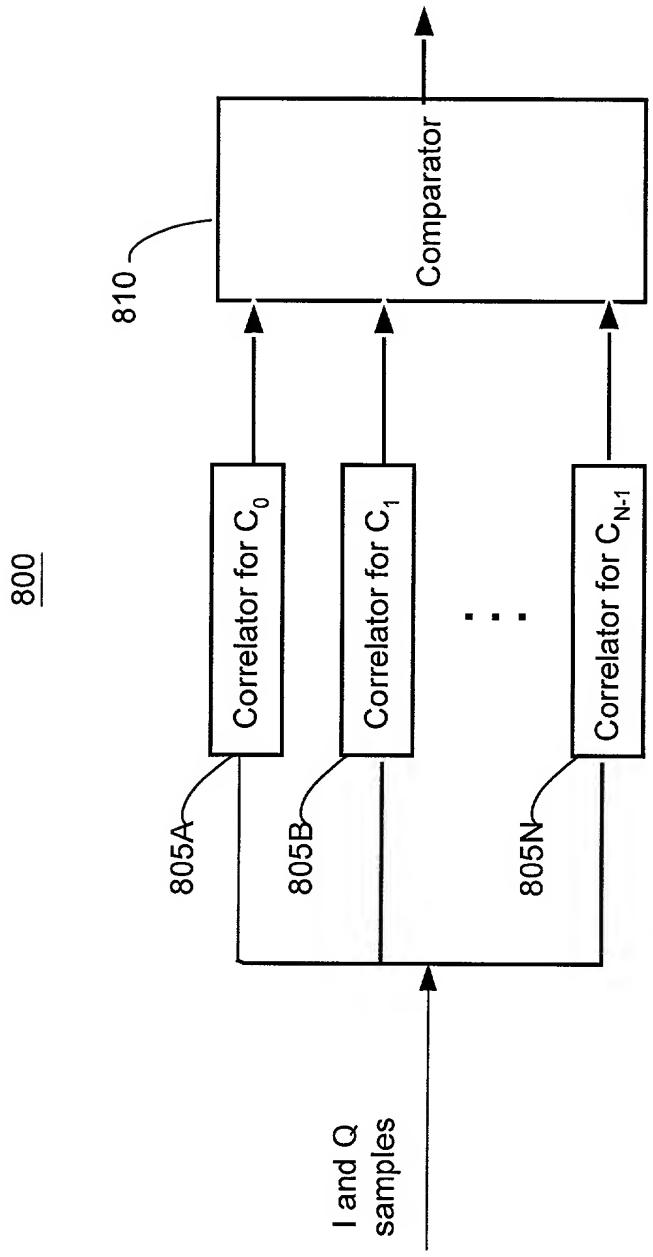
800
810
Comparator
Correlator for C_0
Correlator for C_1
Correlator for C_{N-1}
805A
805B
805N
I and Q samples

FIG. 8

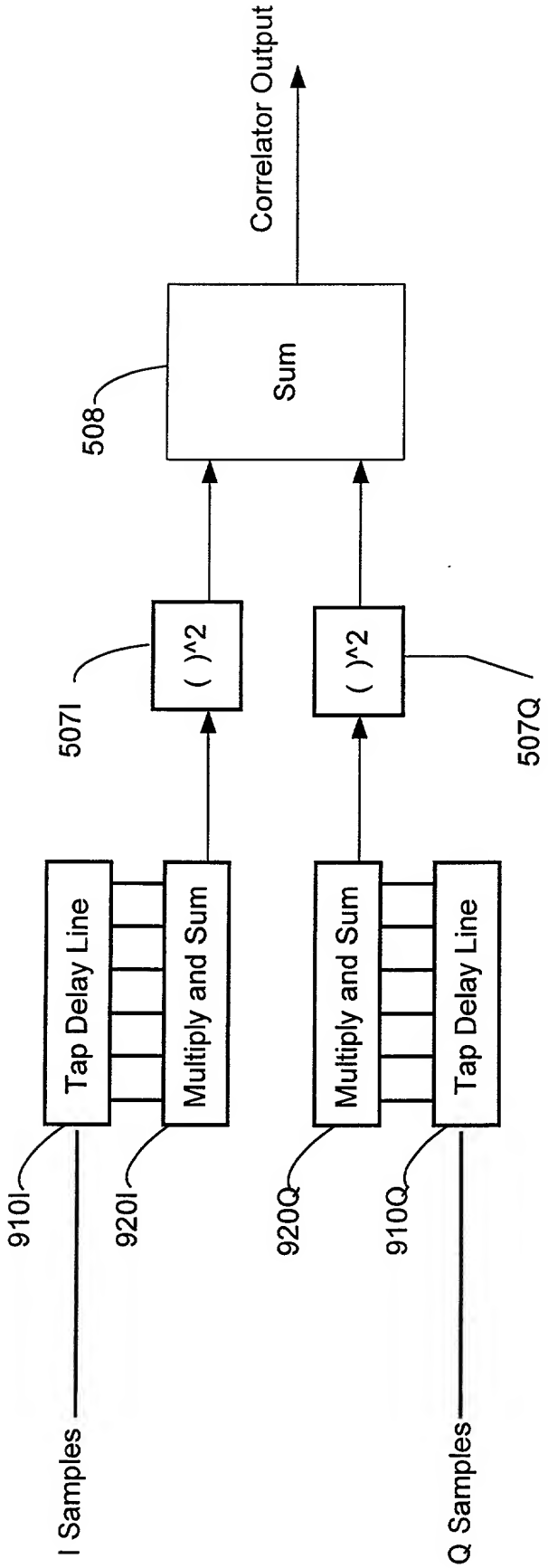
Correlator Output
Sum
508
( )^2
( )^2
507I
507Q
Tap Delay Line
Multiply and Sum
Multiply and Sum
Tap Delay Line
910I
920I
920Q
910Q
I Samples
Q Samples
900

FIG. 9

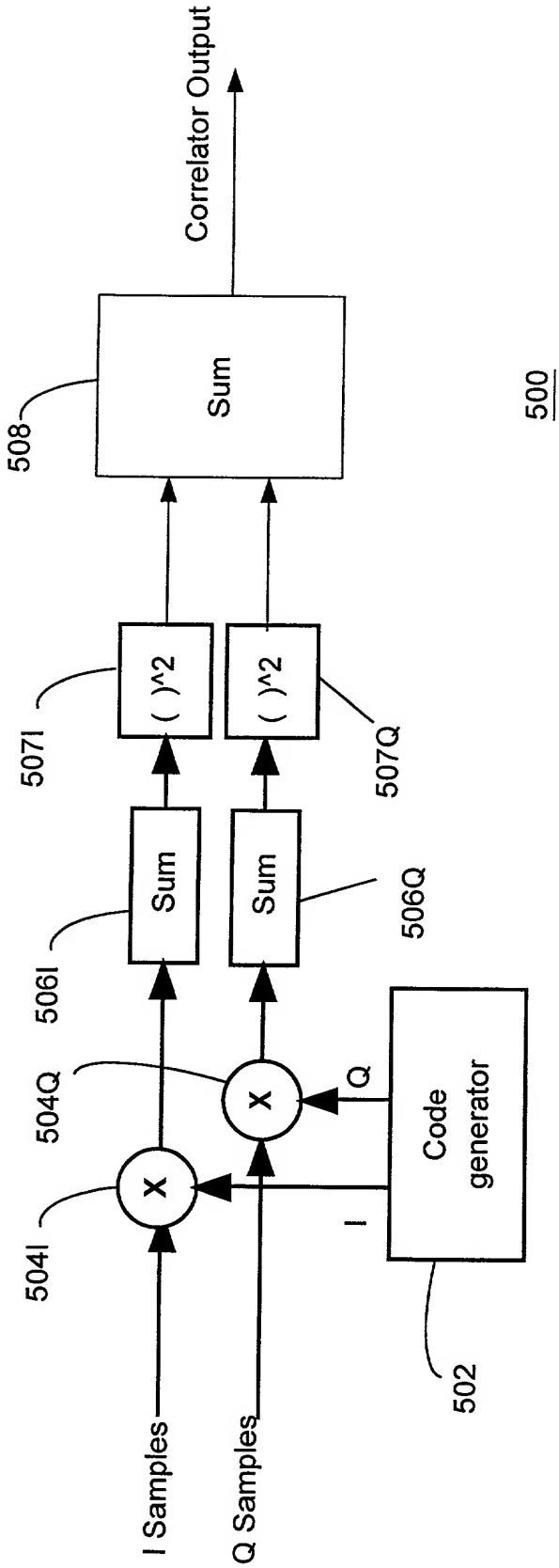
Correlator Output
508
Sum
500
507I
( )^2
507Q
( )^2
506I
Sum
506Q
Sum
504Q
504I
X
X
Q
I
Code generator
502
I Samples
Q Samples

FIG. 10

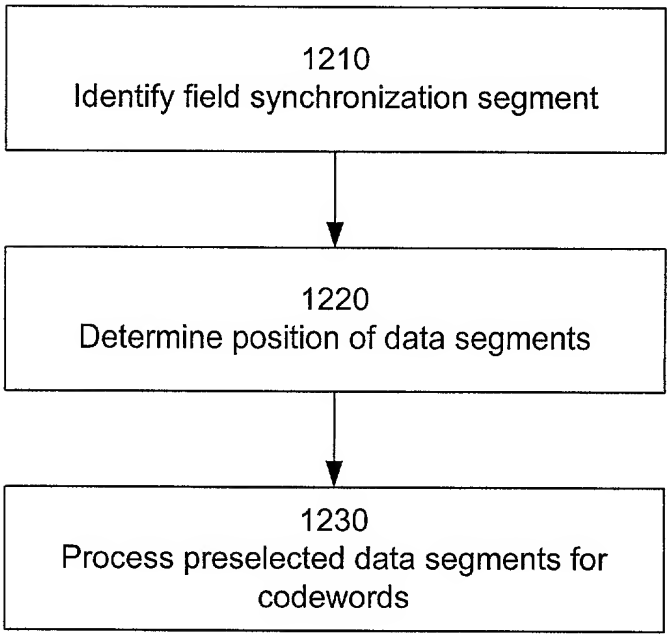
1210
Identify field synchronization segment
1220
Determine position of data segments
1230
Process preselected data segments for codewords

FIG. 11

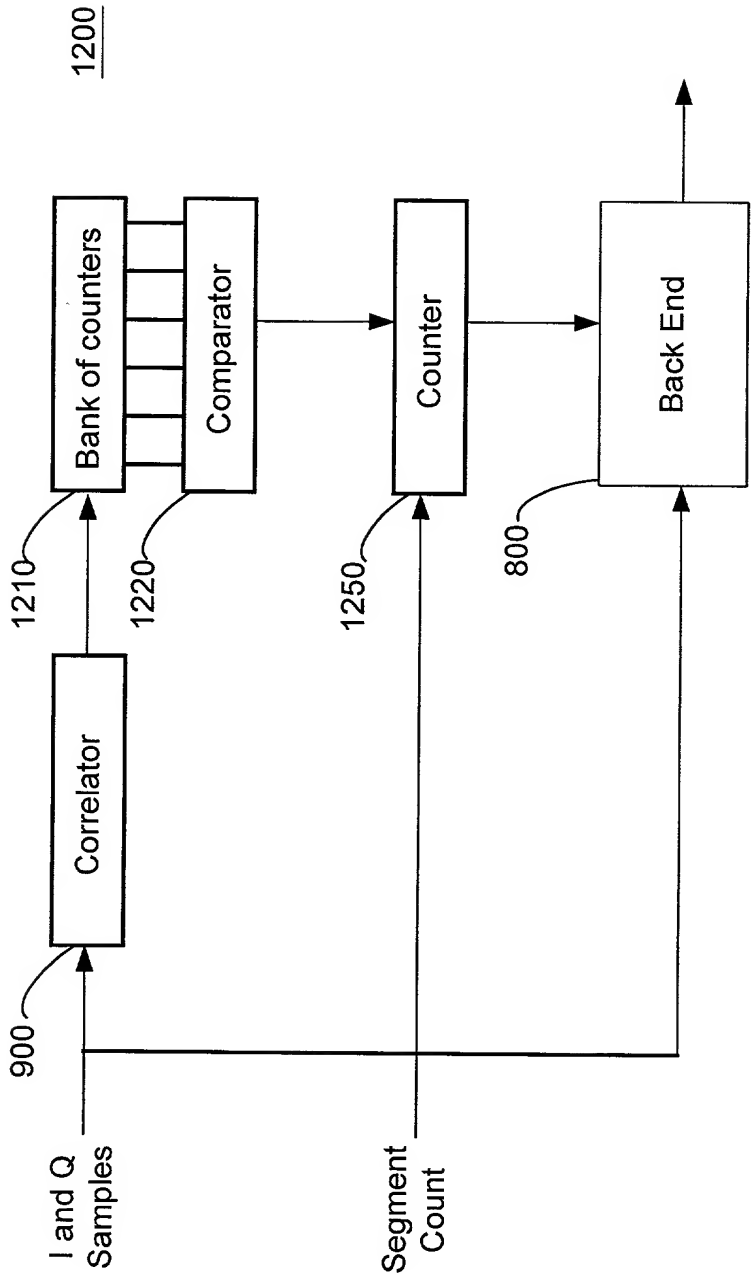
1200
Bank of counters
Comparator
Counter
Back End
Correlator
1210
1220
1250
800
900
I and Q Samples
Segment Count

FIG. 12